



*Type 4763 Electropneumatic Positioner*

## Mounting and Operating Instructions

**EB 8359-2 EN**

Edition April 2014

## Definition of signal words



### **DANGER!**

*Hazardous situations which, if not avoided, will result in death or serious injury*



### **NOTICE**

*Property damage message or malfunction*



### **WARNING!**

*Hazardous situations which, if not avoided, could result in death or serious injury*



### **Note:**

*Additional information*



### **Tip:**

*Recommended action*

<b>1</b>	<b>General safety instructions.....</b>	<b>4</b>
<b>2</b>	<b>Article code.....</b>	<b>5</b>
<b>3</b>	<b>Technical data .....</b>	<b>6</b>
<b>4</b>	<b>Design and principle of operation .....</b>	<b>8</b>
<b>5</b>	<b>Attachment .....</b>	<b>10</b>
5.1	Attachment to valve with cast yoke .....	10
5.2	Attachment to valve with rod-type yoke.....	10
5.3	Housing cover .....	10
<b>6</b>	<b>Connections .....</b>	<b>12</b>
6.1	Electrical connections .....	12
6.2	Pneumatic connections.....	13
6.3	Pressure gauge .....	13
6.4	Supply pressure .....	14
<b>7</b>	<b>Operation .....</b>	<b>15</b>
7.1	Assignment of the positioner and the actuator .....	15
7.1.1	Determining and changing the operating direction .....	16
7.2	Starting point and reference variable.....	18
7.3	Adjustment after mounting the positioner on the valve.....	18
7.3.1	Setting the air delivery (volume restriction Q) and proportional band Xp .....	18
7.3.2	Setting for actuator with fail-safe action "stem extends" .....	20
7.3.3	Setting for actuator with fail-safe action "stem retracts" .....	20
7.4	Exchanging the range spring .....	21
<b>8</b>	<b>Converting the electropneumatic into a pneumatic positioner .....</b>	<b>22</b>
<b>9</b>	<b>Servicing explosion-protected devices .....</b>	<b>24</b>
<b>10</b>	<b>Maintenance, calibration and work on equipment .....</b>	<b>25</b>
<b>11</b>	<b>Accessories and mounting parts.....</b>	<b>26</b>
<b>12</b>	<b>Dimensions in mm.....</b>	<b>27</b>
	<b>Test certificates .....</b>	<b>28</b>

# 1 General safety instructions

For your own safety, follow these instructions concerning the mounting, start up and operation of the positioner:

- The positioner is to be mounted, started up or operated only by trained and experienced personnel familiar with the product.  
According to these mounting and operating instructions, trained personnel is referred to as individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- Explosion-protected versions of this positioner are to be operated only by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.
- Any hazards that could be caused in the valve by the process medium, the signal pressure or by moving parts are to be prevented by taking appropriate precautions.
- If inadmissible motions or forces are produced in the pneumatic actuator as a result of the supply pressure level, it must be restricted using a suitable supply pressure reducing station.
- Proper shipping and storage are assumed.

**Note:**

*Devices with a CE marking fulfill the requirements of the Directives 94/9/EC and 2004/108/EC.*

*The Declaration of Conformity is available on request.*

---

## 2 Article code

Electropneumatic positioners	Type 4763-	x	1	x	0	0	x	x	x	x	0	x	0	x	x	0
Explosion protection																
Without	0						2/7									
Ex II 2 G Ex ia IIC T6 Gb according to ATEX	1															
CSA/FM intrinsically safe/non incendive	3															
Ex II 3 G Ex nA II T6 Gc/Ex ic IIC T6 Gc for Zone 2 acc. to ATEX	8						2/7									
Spring																
Spring 1, travel = 15 mm		1														
Spring 2, travel = 30 mm, split range 15 mm		2														
Spring 3, travel = 60 mm, split range 30 mm		3														
Pneumatic connections																
ISO 228/1 G ¼						1										
¼-18 NPT						3										
Electrical connection (cable gland)																
M20 x 1.5 blue (plastic)							1									
M20 x 1.5 black (plastic)							2									
M20 x 1.5 (nickel-plated brass)							7			2						
i/p converters																
Type 6109							1									
Type 6112							2									
Reference variable																
4 to 20 mA								0								
0 to 20 mA							2	2								
1 to 5 mA							2	3								
Temperature range																
Standard										0						
Low temperature down to -45 °C							2			2						
Special version																
Without												0	0	0		
For oxygen <sup>1)</sup>	0/1											0	1	6		
Ex II 3D IP 54 T 80 °C (with manufacturer's declaration)	8						2/7					0	1	8		
GOST certificate	8						2					0	1	0		

<sup>1)</sup> Special version suitable for oxygen up to maximum +60 °C (according to AIR LIQUIDE test report no. 2014/R 171a1)

### 3 Technical data

Controlled variable (travel range)	7.5 to 60 mm, with lever extension: 7.5 to 90 mm
Reference variable <sup>1)</sup> Split-range 0 to 50 % or 50 to 100 % reference variable span (up to 50 mm travel)	4 to 20 mA (Ex), 4 to 20 mA (without explosion protection), 0 to 20 mA, 1 to 5 mA, $R_i = 250 \Omega$ <sup>2)</sup> $R_i = 200 \Omega$ <sup>2)</sup> $R_i = 200 \Omega$ <sup>2)</sup> $R_i = 880 \Omega$ <sup>2)</sup>
Range spring	See Table 1 on page 19
Supply air	1.4 to 6 bar (20 to 90 psi) Air quality acc. to ISO 8573-1: Max. particle size and density: Class 4 Oil content: Class 3 · Pressure dew point: Class 3
Signal pressure $p_{st}$ (output)	Max. 0 to 6.0 bar (0 to 90 psi)
Characteristic	Linear characteristic Deviation from terminal-based conformity $\leq 1.5 \%$
Hysteresis	$< 0.5 \%$
Sensitivity	$< 0.1 \%$
Operating direction	Reversible
Proportional band $X_p$ (at 1.4 bar supply air)	1 to 3.0 % with spring 1 1 to 2.0 % with spring 2 1 to 1.5 % with spring 3
Air consumption in steady state ( $X_p = 1 \%$ )	With 1.4 bar supply air: $0.19 \text{ m}_n^3/\text{h}$ With 6 bar supply air: $0.5 \text{ m}_n^3/\text{h}$
Air output	At $\Delta p$ 1.4 bar: $3.0 \text{ m}_n^3/\text{h}$ At $\Delta p$ 6 bar: $8.5 \text{ m}_n^3/\text{h}$
Transit time with Type 3271 Actuator, "stem extends"	$240 \text{ cm}^2 \leq 1.8 \text{ s}$ $350 \text{ cm}^2 \leq 2.5 \text{ s}$ $700 \text{ cm}^2 \leq 10.0 \text{ s}$
Perm. ambient temperature <sup>3), 4)</sup>	<b>With Type 6109 i/p Converter:</b> -20 to +70 °C -35 to +70 °C (metal cable gland)  <b>With Type 6112 i/p Converter:</b> -20 to +80 °C -40 to +80 °C (metal cable gland) -45 to +80 °C (special version)

Influences	Temperature: < 0.03 %/1 K Supply air: < 0.3 %/0.1 bar Vibrations: < 2 % between 10 up to 150 Hz and 4 g Variable position when turned by 180°: < 3.5 %
Degree of protection	IP 54 · Venting over check valve (1790-7408): IP 65
Electromagnetic compatibility	Complying with EN 61000-6-2, EN 61000-6-3 and EN 61326-1
Weight	Approx. 1.2 kg
Materials	Housing: Die-cast aluminum, chromated and plastic coated External parts: Stainless steel

- 1) The data listed in the certificate of conformity applies to the version with type of protection Ex ia IIC.
- 2)  $R_i$  = Coil resistance (at approx. 20 °C)  $\pm$  7 % tolerance
- 3) Observe the limits in the certificate of conformity for explosion-protected versions.
- 4) With special version suitable for oxygen up to maximum +60 °C

## 4 Design and principle of operation

The electropneumatic positioner is used to assign the valve position (controlled variable) to the input signal (reference variable). The positioner compares the control signal of a control system to the travel of the control valve and issues a signal pressure (output variable) for the pneumatic actuator.

The positioner consists of an electropneumatic converter unit (21) and a pneumatic unit equipped with a lever (1), shaft (1.1) and range spring as well as the pneumatic control system with nozzle, flapper plate and booster. The DC control signal, e.g. 4 to 20 mA, issued by the controller, is transmitted to the electropneumatic converter unit (i/p converter) where it is converted into a proportional pressure signal  $p_e$ .

Any change of the input current signal causes a proportional change of the air pressure  $p_e$  fed to the pneumatic control system.

The air pressure  $p_e$  produces a force which acts on the surface of the measuring diaphragm (8) and is compared to the force of the range spring (6).

The motion of the measuring diaphragm (8) is transferred to the flapper plate (10.2) over the feeler pin (9.1), and the nozzle (10.1) releases pressure. Any change of either the air pressure  $p_e$  or the valve stem position causes the pressure to change in the booster (12) connected downstream of the nozzle. The signal pressure  $p_{st}$  which is released causes the plug stem to assume a position based on the reference variable.

The adjustable volume restriction Q (14) and  $X_p$  (gain) restriction (13) are used to optimize the control loop of the positioner.

The range spring (6), which can be exchanged, is assigned to both the rated valve travel and the span of the reference variable.

### Legend for Fig. 1 and Fig. 2

1	Lever for valve travel
1.1	Shaft
2	Pin
2.1	Nut
3	Sleeve
4	Zero point adjustment
5	Fastening screw
6	Range spring
6.1	Bracket
7	Fastening screw
8	Measuring diaphragm
9	Diaphragm plate
9.1	Feeler pin
10	Nozzle block
10.1	Nozzle
10.2	Flapper plate
11	Cover plate
12	Booster
13	$X_p$ restriction
14	Volume restriction Q
15	Hole for fastening screw
20	Plate
21	i/p converter



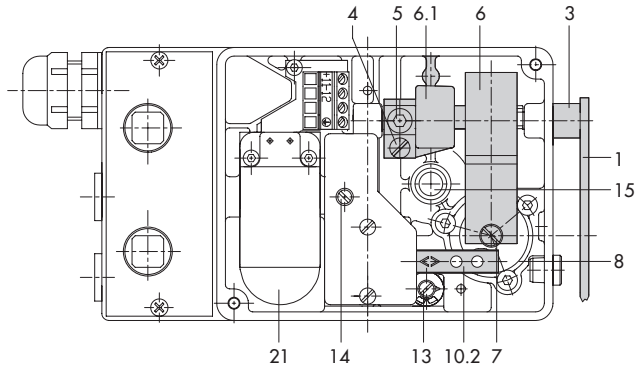


Fig. 1: Positioner with cover removed

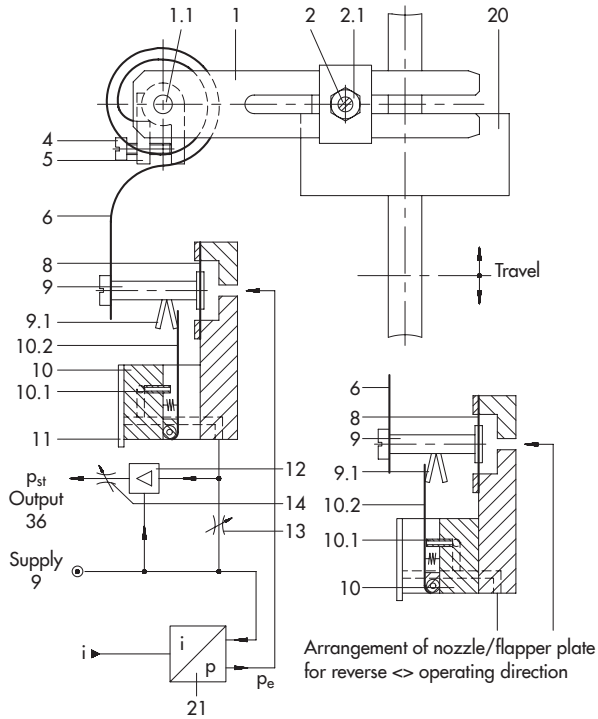


Fig. 2: Functional diagram

## 5 Attachment

To attach the positioner to valves with cast yokes according to IEC 60534-6 (NAMUR rib), mounting parts (order no. 1400-5745) are used. For valves with rod-type yokes, the mounting kit (order no. 1400-5745) and additionally the mounting kit (order no. 1400-5342) are necessary (see also accessories in section 11 on page 26).

Since the positioner can be attached on either side of the valve, the physical location (left or right attachment) should be determined before actual attachment.

➔ See Fig. 6 to Fig. 9 on page 15.

### 5.1 Attachment to valve with cast yoke

1. Fasten the plate (20) to the stem connector (22) of the valve using the screws (21).
2. Unscrew the positioner cover, and secure the positioner to the valve yoke using the fastening screw (15). The O-ring included in the mounting kit is not required for this positioner. Make sure that the pin (2) is inserted through the wire strap and, as a result, clamped against the plate (20).

### 5.2 Attachment to valve with rod-type yoke

1. Fasten the plate (20), off-centered, to the travel indicator (24) of the plug stem (23) using the screws (21).

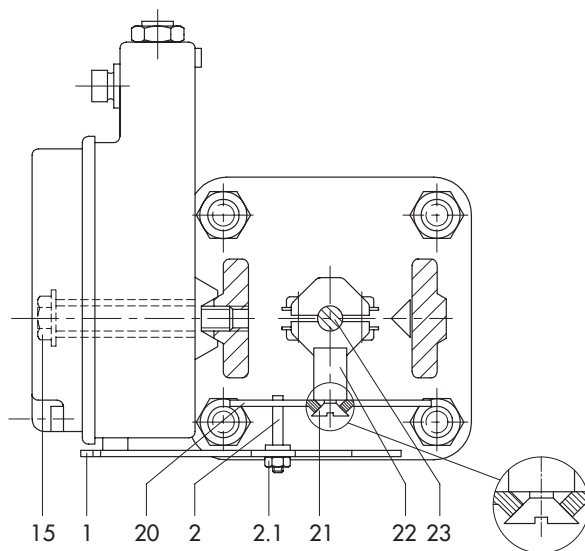
2. Place both the support (28) and the clamping plate (26) on the rod (27) and lightly fasten. Move the support until both the center of the plate (20) and the support (28) are aligned when the valve is at half of the valve travel.
3. Fasten tight the support and the clamping plate.
4. Mount the positioner to the support using the fastening screw (15). Make sure that the pin (2) is inserted through the wire strap and, as a result, clamped against the plate (20).

### 5.3 Housing cover

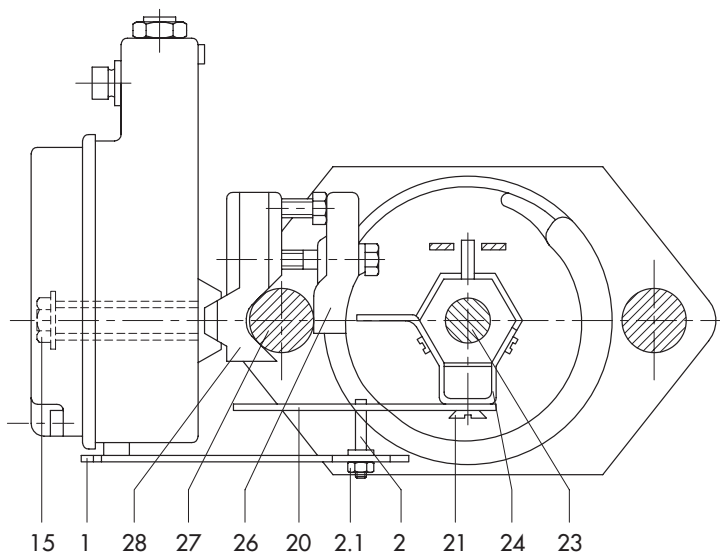
After attaching the positioner, make sure that the vent plug of the housing cover faces downward when the valve is installed.

#### Legend for Fig. 3 and Fig. 4:

1	Lever
2	Pin
2.1	Nut
15	Fastening screw
20	Plate
21	Screw
22	Stem connector
23	Plug stem
24	Travel indicator
26	Clamping plate
27	Rod (pillar)
28	Support



**Fig. 3:** Attachment to valves with cast yokes (NAMUR rib)



**Fig. 4:** Attachment to valves with rod-type yokes

## 6 Connections

### 6.1 Electrical connections



#### **DANGER!**

*For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use. In Germany, these are the VDE regulations and the accident prevention regulations of the employers' liability insurance.*

*The following regulations apply to installation in hazardous areas:*

*EN 60079-14: 2008 (VDE 0165, Part 1) **Explosive Atmospheres – Electrical Installations Design, Selection and Erection.***



#### **NOTICE**

*Adhere to the terminal assignment! Switching the assignment of the electrical terminals may cause the explosion protection to become ineffective. Do not loosen enameled screws in or on the housing. The maximum permissible values specified in the EC type examination certificates apply when interconnecting intrinsically safe electrical equipment ( $U_i$  or  $U_o$ ,  $I_i$  or  $I_o$ ,  $P_i$  or  $P_o$ ,  $C_i$  or  $C_o$  and  $L_i$  or  $L_o$ ).*

#### **Selecting cables and wires:**

Observe clause 12 of EN 60079-14: 2008 (VDE 0165, Part 1) for installation of the intrinsically safe circuits. Clause 12.2.2.7 applies when running multi-core cables and wires with more than one intrinsically safe circuit.

The radial thickness of the insulation of a conductor for common insulating materials (e.g. polyethylene) must not be smaller than 0.2 mm. The diameter of an individual wire in a fine-stranded conductor must not be smaller than 0.1 mm.

Protect the conductor ends against splicing, e.g. by using wire-end ferrules.

When two separate cables or wires are used for connection, an additional cable gland can be installed. Seal cable entries left unused with plugs. Fit equipment used in ambient temperatures below  $-20\text{ }^{\circ}\text{C}$  with metal cable glands.

**Equipment for use in zone 2/zone 22:**

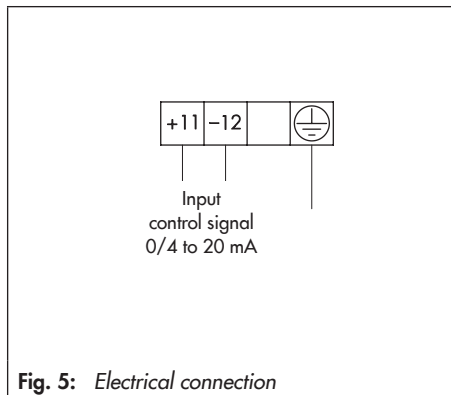
In equipment operated according to type of protection Ex nA II (non-sparking equipment) according to EN 60079-15: 2003, circuits may be connected, interrupted or switched while energized only during installation, maintenance or repair.

Guide the wires for the reference variable over the cable gland to the terminals 11 (+) and 12 (–) located in the housing.

The ground connection can be connected inside or outside of the positioner housing.

**Accessories for electrical connections**

→ See section 11 on page 26



**Fig. 5:** Electrical connection

**6.2 Pneumatic connections**

The pneumatic connections are optionally designed as a bore with ¼ NPT or ISO 288/1-G ¼ thread. Customary fittings for metal or copper tubing or plastic hoses can be used.

**NOTICE**

*Risk of malfunction due to failure to comply with required air quality.*

- Only use supply air that is dry and free of oil and dust.
- Read the maintenance instructions for upstream pressure reducing stations.
- Blow through all air pipes and hoses thoroughly before connecting them.

**6.3 Pressure gauge**

To monitor the positioner, we recommend installing pressure gauges for the supply air and signal pressure. The required parts are listed as accessories in section 11 on page 26.

## 6.4 Supply pressure

The required supply air pressure depends on the bench range and the actuator's operating direction (fail-safe action).

The bench range is written on the nameplate either as the spring range or signal pressure range. The operating direction is marked **FA** or **FE**, or by a symbol.

### Actuator stem extends (FA)

#### Fail-close

(for globe and angle valves)

Required supply pressure = Upper bench range value + 0.2 bar,  
minimum 1.4 bar

### Actuator stem retracts (FE)

#### Fail-open

(for globe and angle valves)

For tight-closing valves, the maximum signal pressure  $p_{st\_max}$  is roughly estimated as follows:

$$p_{st\_max} = F + \frac{d^2 \cdot \pi \cdot \Delta p}{4 \cdot A} \text{ [bar]}$$

$d$  = Seat diameter [cm]

$\Delta p$  = Differential pressure across the valve  
[bar]

$A$  = Actuator diaphragm area [cm<sup>2</sup>]

$F$  = Upper bench range value [bar]

**If there are no specifications, calculate as follows:**

Required supply pressure = Upper bench range value + 1 bar

The positioner output pressure is routed to the top or bottom diaphragm case of the actuator as shown in Fig. 6 to Fig. 9.

## 7 Operation

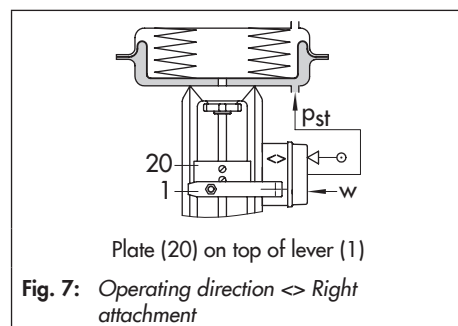
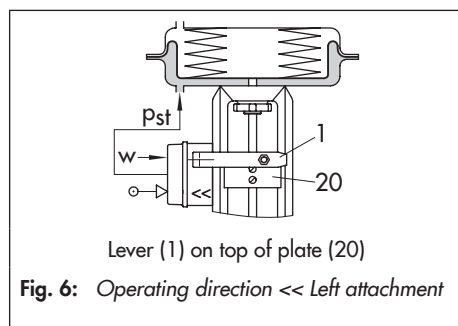
### 7.1 Assignment of the positioner and the actuator

Arrangement of the actuator, the mounting position of the positioner, the reference variable and the operating direction:

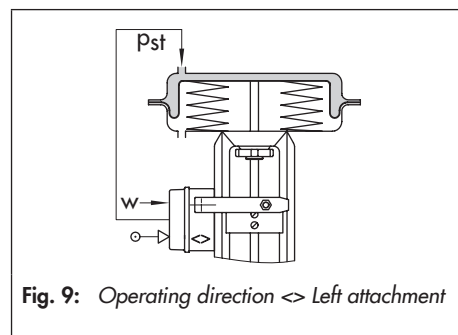
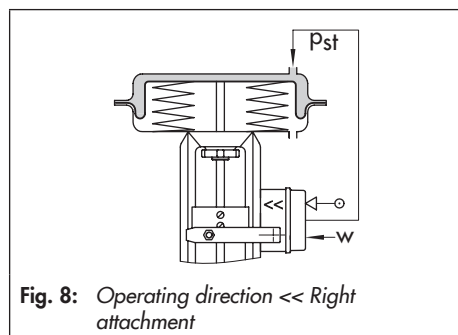
→ See Fig. 6 to Fig. 9

When any subsequent changes are made, e.g. reversing the operating direction of the positioner control loop or changing the actuator fail-safe action from "actuator stem extends" to "actuator stem retracts" or vice versa, the positioner's mounting position must be changed accordingly.

#### Actuator stem extends (FA)



#### Actuator stem retracts (FE)



## 7.1.1 Determining and changing the operating direction

versed "plate on top of lever" is correct (Fig. 6 to Fig. 9).

For an increasing input signal (reference variable), the signal pressure  $p_{st}$  can either be increasing (direct action <<) or decreasing (reverse action <>).

Similarly, as the reference variable decreases, the signal pressure can either decrease (direct action <<) or increase (reverse action <>).

On the flapper plate, the operating direction is indicated by symbols (direct <<, reverse <>). Depending on the position of the flapper plate, the adjusted operating direction and the associated symbol become visible.

If the required operating direction does not correspond to the visible symbol, or if the operating direction is to be changed, proceed as follows:

1. Unscrew both screws on the cover plate, and lift off the nozzle block along with the cover plate.
2. Reinstall the nozzle block turned 180° together with the cover plate, and refasten.

Make sure that the nozzle block and flapper plate are correctly located above or below the feeler pin as shown in Fig. 10.

If the operating direction is to be changed after the initially determined arrangement of positioner and actuator, note that the positioner must be mounted in a different location and the nozzle block must be turned.

Make sure the location of the lever (1) and the plate (20), "lever on top of plate" or re-



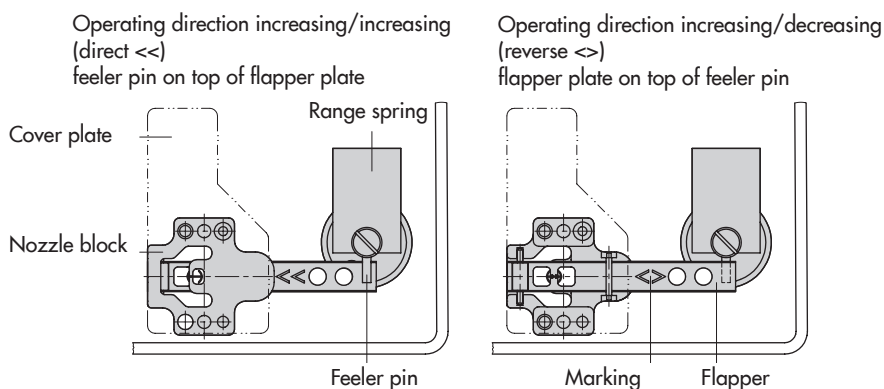


Fig. 10: Position of nozzle block, cover plate removed

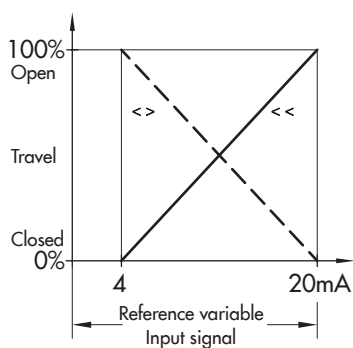


Fig. 11: Normal operation

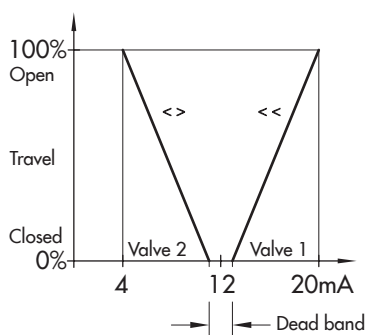


Fig. 12: Split-range operation, two valves operating in opposing directions

## 7.2 Starting point and reference variable

The attached lever and the installed range spring of the positioner are assigned to the values of rated valve travel and the reference variable as in Table 1.

In normal operation, the reference variable span is  $100\% = 16 \text{ mA}$ . A smaller span of, for example,  $50\% = 8 \text{ mA}$  is only required for split-range operation (Fig. 12).

The span can be changed by exchanging the range spring (section 7.4). On making adjustments to the positioner, the travel must be adapted to the reference variable and vice versa.

With a reference variable, for example, 4 to 20 mA, the valve must move through its entire travel range from 0 to 100 %. The starting point then is 4 mA and the upper range value 20 mA.

In split-range operation, the controller output signal is used to control two control valves, dividing it such that the valves move through their entire travel range at half the input signal range each (e.g. first valve set to 4 to 12 mA, second valve set to 12 to 20 mA). To avoid overlapping, allow for a dead band of  $\pm 0.5 \text{ mA}$  as shown in Fig. 12.

The starting point (zero) is adjusted at the screw (4); the reference variable span, i.e. the upper range value, is adjusted at the pin (2).

## 7.3 Adjustment after mounting the positioner on the valve

- ➔ Connect an ammeter to the control signal input at the terminals 11 (+) and 12 (-).
- ➔ Connect the supply air to the supply input (supply 9).

### 7.3.1 Setting the air delivery (volume restriction Q) and proportional band Xp

1. Close the volume restriction (14) as far as the required positioning speed permits.  
Check the positioning speed by pushing the range spring (6) as far it will go.
2. Adjust the reference variable at the input to approx. 50 % of its range. Then, turn the zero adjustment screw (4) until the valve is at approximately 50 % valve travel.

On setting the Xp restriction, observe the relationship with the supply air pressure as indicated in Fig. 13. The preset value of Xp should be approximately 3 %.

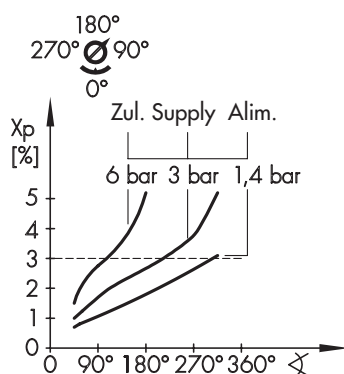
3. Check the plug stem's tendency to oscillate by pressing the range spring (6) briefly as far as it will go.  
The Xp value is to be adjusted to be as small as possible, without considerable overshooting occurring.

#### Additional points that apply concerning adjustment:

- ➔ Always adjust the Xp restriction before setting the starting point.

**Table 1:** Range springs

Rated travel [mm]	Min./max. travel [mm]	Reference variable (input signal)	Range spring
Standard travels for SAMSON valves with lever I (40 to 127 mm in length)			
15	7.5 to 15	100 %	1
		50 %	2
30	14 to 32	100 %	2
		50 %	3
60	30 to 70	100 %	3
Further travel ranges with lever I and lever extension (40 to 200 mm in length)			
20	7.5 to 26	100 %	1
		50 %	2
40	14 to 50	100 %	2
		50 %	3
> 60	30 to 90	100 %	3



**Fig. 13:** Setting the  $X_p$  restriction

- ➔ In case of a zero shift (e.g. due to a subsequent change in the restriction setting or supply pressure), check the zero setting and readjust it.
- ➔ The adjustment range of the Xp restriction is restricted by the pointer and stop to one turn (Fig. 13). Do not remove the pointer!

### 7.3.2 Setting for actuator with fail-safe action "stem extends"

To ensure that the total closing force of the actuator acts on the valve, proceed as follows:

- ➔ With direct operating direction <<: adjust starting point to 4.5 mA (slightly raised).
- ➔ With reverse operating direction >>: adjust starting point to 19.5 mA (slightly lowered).

#### Starting point (zero) e.g. 4.5 mA

1. Turn the zero adjustment screw (4) until the plug stem just starts to move out of its resting position (observe travel indicator).
2. Reduce the input signal to 0 mA and slowly increase it again. Check whether the plug stem starts to move at exactly 4.5 mA and correct, if necessary.

#### Upper range value (span) e.g. 20 mA

3. Once the starting point has been set, increase the input signal. At exactly 20 mA, the plug stem must stand still,

having moved through 100 % travel (watch the travel indicator at the valve). If the upper range value is incorrect, move the pin (2) as follows to correct it:

#### 4. Move towards

Lever end → To increase the travel

Fulcrum → To reduce the travel

After correcting the input signal, re-adjust zero. Then check the upper range value again.

Repeat the correction procedure until both values are correct.

### 7.3.3 Setting for actuator with fail-safe action "stem retracts"

When using an actuator with "actuator stem retracts" fail-safe action, the diaphragm chamber must be pressurized with a signal pressure that is high enough to tightly close the valve against the upstream pressure in the plant.

- ➔ Operating direction <<: Upper range value of reference variable 20 mA
- ➔ Operating direction >>: Lower range value of reference variable 4 mA

The required signal pressure is either indicated on the positioner label or the required supply pressure can be roughly calculated as described in section 6.4.

#### Starting point e.g. 20 mA

1. Set the input signal at the ammeter to 20 mA.

Turn the zero adjustment screw (4) until the plug stem just starts to move out of its initial position.

2. Increase the input signal and slowly reduce it again to 20 mA. Check whether the plug stem starts to move at exactly 20 mA.

Correct any deviation at the zero adjustment screw (4). Turning it counterclockwise causes the plug stem to move from its end position earlier; turning it clockwise causes it to move from its end position later.

#### Upper range value (span) e.g. 4 mA

3. Once the starting point has been set, increase the input signal to 4 mA at the ammeter.

At exactly 4 mA, the plug stem must stand still, having moved through 100 % travel (watch the travel indicator at the valve).

4. If the upper range value is incorrect, move the pin (2) to correct it. Readjust 20 mA and turn the zero adjustment screw (4) until the pressure gauge indicates the **required signal pressure**. If no pressure gauge has been installed, set the starting point to 19.5 mA instead.

## 7.4 Exchanging the range spring

If the range is to be altered or changed to split-range operation, replace the range spring as shown in Fig. 1 on page 9 as follows:

1. Unscrew screw (7) on the range spring. Undo hexagon socket screw (5) and pull out the lever together with shaft.
2. Exchange range spring. Slide lever with shaft through sleeve (3), positioner housing and bracket (6.1).
3. Secure range spring with the screw (7).
4. Move bracket and shaft until the screw (5) sits on the flattened part of the shaft. Tighten screw (5). Allow for a play of 0.05 to 0.15 mm between the lever (1) and the sleeve (3) as well as between the range spring (6) and the positioner housing.

## 8 Converting the electropneumatic into a pneumatic positioner

The electropneumatic positioner can be converted into a Type 4765 Pneumatic Positioner with a conversion kit.

### Legend for Fig. 14

- 1 Cable gland
- 2 Printed circuit board
- 3 i/p converters
- 4 Connecting nipple
- 5 Hose
- 6 Connecting plate
- 7 Sealing element



#### Note:

*The version suitable for oxygen of the Type 4763 Pneumatic Positioner cannot be converted to form a Type 4765 Electropneumatic Positioner.*

→ Required conversion kits: see Table 2

1. Unscrew fastening screws and lift the i/p converter together with the printed circuit board out of the positioner housing.
2. Unthread cable gland (1). Plug on hose (5) and screw the connecting nipple (4) of the conversion kit tightly on the housing.
3. Insert sealing element (7) into connecting plate (6) and fasten it tight into the housing.
4. Push the free end of the hose onto the connecting plate (6).



#### Note:

*For details on the converted Type 4765 Positioner, refer to Mounting and Operating Instructions*  
 ► EB 8359-1 EN.

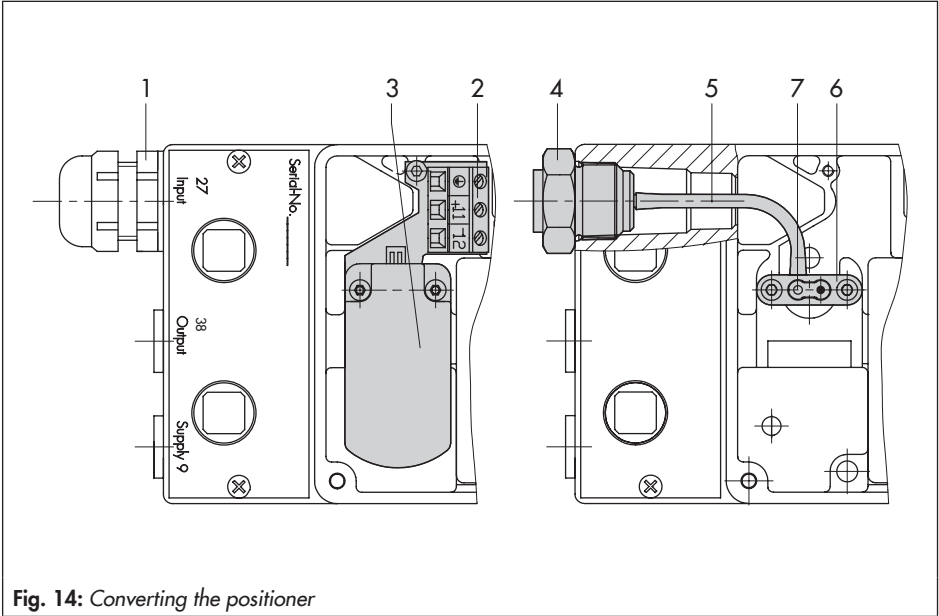


Fig. 14: Converting the positioner

Table 2: Conversion kits

Required conversion kit up to device index .02.	
For connection with G thread	Order no. 1400-6724
For connection with NPT thread	Order no. 1400-6725
Required conversion kit for device index .03 and higher.	
For connection with G thread	Order no. 1400-6795
For connection with NPT thread	Order no. 1400-6796

## 9 Servicing explosion-protected devices

If a part of the device on which the explosion protection is based needs to be serviced, the device must not be put back into operation until a qualified inspector has assessed it according to explosion protection requirements, has issued an inspection certificate or given the device a mark of conformity.

Inspection by a qualified inspector is not required if the manufacturer performs a routine test on the device before putting it back into operation. Document the passing of the routine test by attaching a mark of conformity to the device.

Replace explosion-protected components only by original, routine-tested components provided by the manufacturer.

**Devices that have already been used outside hazardous areas and are intended for future use inside hazardous areas must comply with the safety requirements placed on serviced devices. Before being operated inside hazardous areas, test the devices according to the specifications for servicing explosion-protected devices.**



## 10 Maintenance, calibration and work on equipment

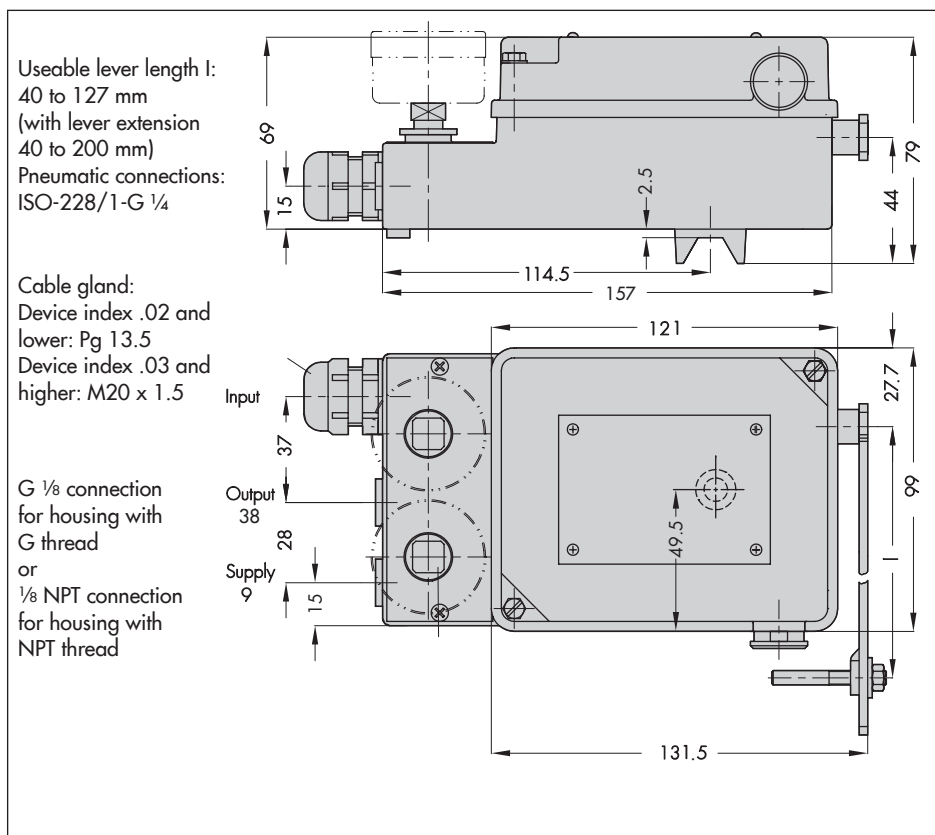
Interconnection with intrinsically safe circuits to check or calibrate the equipment inside or outside hazardous areas is to be performed only with intrinsically safe current/voltage calibrators and measuring instruments to rule out any damage to components relevant to explosion protection.

Observe the maximum permissible values specified in the certificates for intrinsically safe circuits.

# 11 Accessories and mounting parts

Accessories – Mounting parts	Order no.
Range spring 1	1190-0736
Range spring 2	1190-0737
Range spring 3	1190-0738
Lever I	1690-6469
Lever extension	1400-6716
Pressure gauge attachment	1400-6950
Pressure gauge attachment (copper-free)	1400-6951
Mounting unit for valves with cast yoke according to NAMUR Valves with rod-type yoke according to NAMUR for 18 to 35 mm rod diameter	1400-5745 1400-5745 and 1400-5342
Assortment of spare parts including gaskets and diaphragms	1400-6792
Assortment of spare parts including gasket, diaphragms and pneumatic parts (for positioners with device index .02 and higher)	1402-0040
Upgrade to degree of protection IP 65: Venting over check valve	1790-7408
Accessories for electrical connections	Order no.
Black cable gland M20 x 1.5	1400-6985
Brown cable gland M20 x 1.5	1400-6986
Adapter M20 x 1.5 to ½ NPT, powder-coated aluminum:	0310-2149

# 12 Dimensions in mm





TRANSLATION

EC TYPE EXAMINATION CERTIFICATION

(1) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 94/9/EC**

(3) EC Type Examination Certificate Number

**PTB 02 ATEX 2078**

- (4) Equipment: Model 4763-1... /P Positioner
- (5) Manufacturer: SAMSON AG, Mess- und Regeltechnik
- (6) Address: Weismüllerstr. 3, D-60314 Frankfurt, Germany
- (7) This equipment and any acceptable variations thereof are specified in the schedule to this certificate.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres as specified in Annex II to the Directive.

The examination and test results are recorded in confidential report

**PTB-Ex 02-22054.**

(9) The Essential Health and Safety Requirements are satisfied by compliance with

**EN 50014: 1997+A1+A2      EN 50020: 1994**

(10) If the sign “Ex” is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) According to the Directive 94/9/EC, this EC TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of the equipment.

EC Type Examination Certificate without signature and seal are invalid.  
This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.  
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.



(12) The marking of the equipment shall include the following:



Zertifizierungsstelle Explosionsschutz      Braunschweig, 19. July 2002  
By order

(Signature)      (Seal)

Dr. Ing. U. Johannsmeyer  
Regierungsdirektor

EC Type Examination Certificate without signature and seal are invalid.  
This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.  
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt  
Braunschweig und Berlin

PTB

Schedule

(14) EC TYPE EXAMINATION CERTIFICATE No. PTB 02 ATEX 2078

Description of Equipment

The Model 4763-1... I/P Positioner is intended for attachment to pneumatic control valves. It serves for converting control signals of (0)...20 mA or 1...5 mA from a controlling system into a pneumatic actuating pressure of 6 bar max. For auxiliary power non-combustible media are used.

The I/P converter circuit is a positive two-terminal network which may be connected to any certified intrinsically safe circuit, provided the permissible maximum values of U<sub>i</sub> and P are not exceeded.

The device is intended for use inside and outside of hazardous locations.

The correlation between version, temperature classification, permissible ambient temperature ranges and maximum short-circuit currents is shown in the table below:

Version 4763-1 ...1... with Model 6109 I/P Module

Temperature class	Permissible ambient temperature range	Maximum short-circuit current
T6	-45 °C ... 60 °C	85 mA
T5	-45 °C ... 70 °C	
T4	-45 °C ... 80 °C	
T5	-45 °C ... 70 °C	100 mA
T4	-45 °C ... 80 °C	

Version 4763-1 ...2... with Model 6112 I/P Module

Temperature class	Permissible ambient temperature range	Maximum short-circuit current
T6	-45 °C ... 60 °C	85 mA or
T5	-45 °C ... 70 °C	100 mA
T4	-45 °C ... 80 °C	120 mA

EC Type Examination Certificates without signature and seal are invalid.  
This EC Type Examination Certificate is valid only for the equipment and conditions specified in the schedule included.  
Extensions or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig

PTB-96-4763.doc

Physikalisch-Technische Bundesanstalt  
Braunschweig und Berlin

PTB

Electrical data

Signal circuit  
(terminals 11 / 12)

Type of protection: intrinsic safety Ex: ia IIC  
only for connection to a certified  
intrinsically safe circuit

Maximum values:

- U<sub>i</sub> = 28 V
- U<sub>o</sub> = 110 mA or 85 mA
- P<sub>i</sub> = 0.7 W
- U<sub>o</sub> = 25 V
- I<sub>o</sub> = 120 mA
- P<sub>i</sub> = 0.7 W
- C<sub>i</sub> = negligible
- L<sub>i</sub> = negligible

(16) Test Report PTB Ex 02-22054

(17) Special conditions for safe use

None

(18) Essential Health and Safety Requirements

In compliance with the standards specified above.

Zertifizierungsstelle Explosionsschutz

By order

Braunschweig, 19. July 2002

(Signature) (seal)

Dr. Ing. U. Johannsmeyer  
Regierungsdirektor

EC Type Examination Certificates without signature and seal are invalid.  
This EC Type Examination Certificate is valid only for the equipment and conditions specified in the schedule included.  
Extensions or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig

PTB-96-4763.doc



TRANSLATION

Statement of Conformity

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres –  
**Directive 94/9/EC**

(3) EC Type Examination Certificate Number

**PTB 03 ATEX 2183 X**

(4) Equipment: Model 4763-8 I/P Positioner

(5) Manufacturer: Samson AG

(6) Address: Weismüllerstr. 3, D-40314 Frankfurt, Germany

(7) This equipment and any acceptable variation therefor are specified in the schedule to this certificate and the documents referred to therein.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report

**PTB Ex 03-23304**

(9) The Essential Health and Safety Requirements are satisfied by compliance with

**EN 50021: 1999**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) In compliance with the Directive 94/9/EC this Statement of Conformity relates only to the design and construction of the equipment specified. Further requirements of this Directive apply to manufacture and marketing of this equipment.

1/4

EC Type Examination Certificates without signature and seal are invalid.  
This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.  
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig

PTB 03 Ex n.doc



(12) The marking of the equipment shall include the following:



Zertifizierungsstelle Explosionsschutz

Braunschweig, 30. September 2003

By order

(Signature)

(Seal)

Dr. Ing. U. Johannsmeyer  
Regierungsdirektor

2/4

EC Type Examination Certificates without signature and seal are invalid.  
This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.  
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig

PTB 03 Ex n.doc

Physikalisch-Technische Bundesanstalt  
Braunschweig und Berlin



(13) **Schedule**

(14) **Statement of Conformity PTB 01 ATEX 2170 X**

(15) **Description of Equipment**

The Model 4763-8... I/P Positioner is intended for attachment to pneumatic control valves. It serves for converting control signals of (0/4 ... 20mA or 1 ... 5mA from a controlling system into a pneumatic actuating pressure of 6bar max.

For pneumatic auxiliary power non-combustible media are used.

The device is intended for use inside and outside of hazardous areas...

The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

Temperature class	Permissible ambient temperature range
T6	-45°C ... 60°C
T5	-45°C ... 70°C
T4	-45°C ... 80°C

**Electrical data**

Signal circuit  
(terminals 11/12)

Type of protection: EEx nA II

(16) Test report: **PTB Ex 03-23304**

(17) **Special conditions for safe use**

The signal circuit (terminals 11/12) shall be preceded with by a fuse installed outside of the hazardous area.  
This fuse shall comply with IEC 60127-2/II, 250V F, or with IEC 60127-2/VI, 250V T, with a fuse nominal current In of ≤ 50mA max.

The positioner shall be mounted in an enclosure providing at least Degree of Protection IP 54 in compliance with the IEC Publication 60529.  
This requirement applies also to the cable entries and/or plug connectors.

The wiring shall be connected in such a manner that the connection facilities are not subjected to pull and twisting.

3/4

EC Type Examination Certificates without signature and seal are invalid.  
The EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.  
Copies or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig      PTB 09 Ex n.doc

Physikalisch-Technische Bundesanstalt  
Braunschweig und Berlin



**Schedule of the Statement of Conformity**

(18) **Basic health and safety requirements**

Are satisfied by compliance with the standard specified above.

Zertifizierungsstelle Explosionsschutz

Braunschweig,

By order

(Signature)                      (seal)

Dr. Ing. U. Johannsmeyer

4/4

EC Type Examination Certificates without signature and seal are invalid.  
The EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.  
Copies or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig      PTB 09 Ex n.doc

### Installation Manual for apparatus certified by CSA for use in hazardous locations.

Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

**Table 1: Maximum values**

Signal circuit	U <sub>i</sub> or V <sub>max</sub>	I <sub>i</sub> or I <sub>max</sub>	P <sub>i</sub> or P <sub>max</sub>	C <sub>i</sub>	L <sub>i</sub>
	28V	115mA	0,7W	0nF	0µH

U<sub>o</sub> or V<sub>oc</sub> ≤ U<sub>i</sub> or V<sub>max</sub> / I<sub>o</sub> or I<sub>ec</sub> ≤ I<sub>i</sub> or I<sub>max</sub> / P<sub>o</sub> ≤ P<sub>i</sub> or P<sub>max</sub>; C<sub>o</sub> ≥ C<sub>i</sub> and L<sub>o</sub> ≥ L<sub>i</sub>

**Table 2: CSA - certified barrier parameters of solenoid valve circuit**

Barrier	Supply barrier		Evaluation barrier	
	V <sub>max</sub>	R <sub>min</sub>	V <sub>max</sub>	
Signal circuit	≤ 28V	≥ 280Ω	28V	Diode Return

**Table 3:** The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

Temperature class	Permissible ambient temperature range
T6	60°C
T5	-45°C ... 70°C
T4	80°C

Intrinsically safe if installed as specified in manufacturer's installation manual.

**CSA- certified for hazardous locations**

Ex to IIC T6; Class I, Zone 0

Class I; Groups A, B, C, D

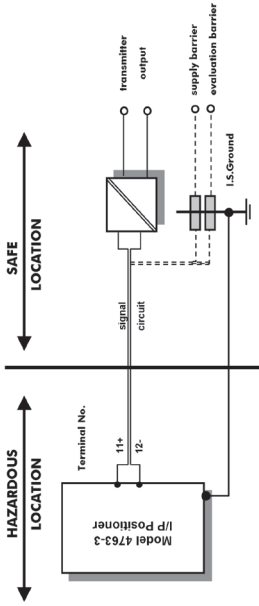
Class II; Groups E, F + G; Class III

#### Notes:

- 1.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with the CSA certified apparatus. For maximum values of U<sub>i</sub> or V<sub>max</sub> ; I<sub>i</sub> or I<sub>max</sub> ; P<sub>i</sub> or P<sub>max</sub> ; C<sub>i</sub> and L<sub>i</sub> of the various apparatus see Table 1.
- 2.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with the CSA certified intrinsically safe barrier.  
For barrier selection see Table 2.
- 3.) Installation shall be in accordance with the Canadian Electrical Code Part 1.
- 4.) Use only supply wires suitable for 5°C above surrounding temperature.

Revisions Control Number: 1 May 05

Addendum to EB 8359-2 EN



Version: Model 4763-3 I/P Positioner.

Supply and evaluation barrier CSA certified.

For the permissible maximum values for the intrinsically safe circuit see Table 1  
For the permissible barrier parameters for the circuit see Table 2

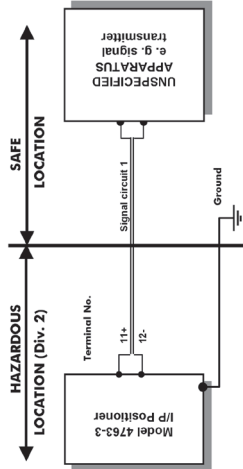
Cable entry M 20 x 1.5 or metal conduit according to drawing No. 1050 - 0539 T or 1050 - 0540 T

**CSA- certified for hazardous locations**

Class I; Div. 2, Groups A, B, C, D

Class II; Div. 2, Groups E, F + G, Class III

#### Type 3 Enclosure



#### Notes:

- 1.) For the maximum values for the circuit see Table 1 and 2.
- 2.) Cable entry only rigid metal conduit according to drawing No. 1050-0539 T and 1050-0540 T

Revisions Control Number: 1 May 05

Addendum to EB 8359-2 EN



Installation Manual for apparatus approved by FM for use in hazardous locations.  
Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

Table 1: Maximum values

	U <sub>0</sub> or V <sub>max</sub>	I <sub>0</sub> or I <sub>max</sub>	P <sub>0</sub> or P <sub>max</sub>	G <sub>0</sub>	L <sub>0</sub>
Signal circuit	28V	115mA	0,7W	0nF	0 μH

Notes: U<sub>0</sub> or V<sub>oc</sub> or V<sub>i</sub> ≤ U<sub>0</sub> or V<sub>max</sub> / I<sub>0</sub> or I<sub>oc</sub> or I<sub>i</sub> ≤ I<sub>0</sub> or I<sub>max</sub>  
P<sub>0</sub> or P<sub>max</sub> ≤ P<sub>0</sub> or P<sub>max</sub>

Table 2: FM - approved barrier parameters of solenoid valve circuit

Barrier	Supply barrier			Evaluation barrier		
	V <sub>oc</sub>	R <sub>min</sub>	I <sub>oc</sub>	V <sub>oc</sub>	R <sub>min</sub>	I <sub>oc</sub>
Signal circuit	≤ 28V	≥ 280Ω	≤ 115mA	28V	#	0mA

Table 3: The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

Temperature class	Permissible ambient temperature range
T6	60°C
T5	- 45°C ≤ t <sub>a</sub> ≤ 70°C
T4	80°C

Intrinsically safe if installed as specified in manufacturer's installation manual.

FM- approved for hazardous locations

Class I, Zone 0, A Ex ia IIC T6

Class I, II, III, Division 1, Groups A, B, C, D, E, F + G

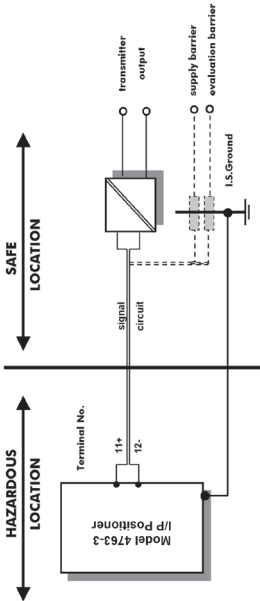
NEMA 3R

Notes:

- 1.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with the FM approved apparatus. For maximum values of U<sub>0</sub> or V<sub>max</sub> ; I<sub>0</sub> or I<sub>max</sub> ; P<sub>0</sub> or P<sub>max</sub> ; C<sub>0</sub> and L<sub>0</sub> of the various apparatus see Table 1.
- 2.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with the FM approved intrinsically safe barrier.  
For barrier selection see Table 2.
- 3.) Installation shall be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA RP 12.06.01
- 4.) Use only supply wires suitable for 5°C above surrounding temperature.

Revisions Control Number: 1 August 04

Addendum to EB 8359-2 EN



Version: Model 4763-3 I/P Positioner.

Supply and evaluation barrier FM/CSA- approved.

For the permissible maximum values for the intrinsically safe circuit see Table 1  
For the permissible barrier parameters for the circuit see Table 2

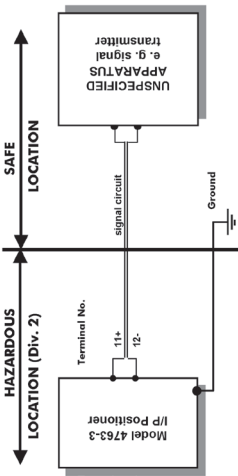
Cable entry M 20 x 1.5 or metal conduit according to drawing No. 1050 – 0539 T or 1050 – 0540 T

FM- approved for hazardous locations

Class I, Division 2, Groups A, B, C, D

Class II Division 2, Groups F + G, Class III

NEMA 3R



Notes:

- 1.) For the maximum values for the circuit see Table 1 and 2.
- 2.) Cable entry only rigid metal conduit according to drawing No. 1050-0539 T and 1050-0540 T
- 3.) The installation shall be in accordance with the National Electrical Code ANSI/NFPA 70

Revisions Control Number: 1 August 04

Addendum to EB 8359-2 EN







SAMSON AG · MESS- UND REGELTECHNIK  
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany  
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
samson@samson.de · [www.samson.de](http://www.samson.de)

**EB 8359-2 EN**

2014-10-09 · English